

DEPARTMENT OF HEALTH
RADIOACTIVE AIR EMISSIONS
LICENSE AMENDMENT FOR

**PROJECT TITLE: MEDICAL ISOTOPE RESEARCH USING TH-232 IN THE
RADIOCHEMICAL PROCESSING LABORATORY (325 BUILDING)**

Date Approved: 12-Feb-02

Emission Unit Name: EP-325-01-S

This is a MAJOR, ACTIVELY ventilated emission unit.

This emission unit requires the following Abatement Technology:

Applicable Requirements: ALARACT

ALARACT [WAC 246-247-040(4)]
BARCT [WAC 246-247-040(3)]

Zone or Area:	Abatement Technology	Required # of Units	Additional Description/Conditions
	HEPA	2	2 in series
	Fan	3	4 in parallel (3 operational, 1 backup)

Additional abatement technologies required by this Notice of Construction will be listed in the Conditions and Limitations section.

This emission unit has the following Monitoring and Sampling Requirements:

Applicable Requirements: Monitoring, Testing and Quality Assurance WAC 246-247-075

Regulatory Requirements	Monitoring and Testing Procedure	Radionuclides Requiring Measurement	Sampling Frequency
40 CFR 61.93(b)(4) & WAC 246-247-75(2)	Method 2 Appendix A; Appendix B, Method 114	All radionuclides which could contribute 10% of the potential EDE.	Particulates are continuously sampled and analyzed every two-weeks for gross alpha and gross beta, composited on a semi-annual basis and analyzed isotopically. Tritium samples are analyzed on a monthly basis.

Sampling Requirements: Continuous particulate using filter and tritium using silica gel.

Additional monitoring or sampling requirements established by this NOC will be listed in the Conditions and Limitations section.

Change History

- 12/14/01 Notice of Construction modification submitted to incorporate a new process that increases the amount of thorium parent material to 30,000 kg. Approval letter, AIR 02-206 mailed on February 13, 2002 replaced all previous Conditions/Limitations for this NOC.
- 07/24/01 NOC revision approved at the July 24, 2001 RTAM to provide a condition change. Approval letter, AIR 01-803 mailed on August 23, 2001.
- 09/25/00 NOC Short Form approved September 25, 2000.

CONDITIONS AND LIMITATIONS

- 1) The U.S. Department of Energy shall comply with all Conditions and Limitations of this license

(WAC 246-247-060(5)).

- 2) The total abated emission limit for this Notice of Construction is limited to 8.46E-01 mrem/year to the Maximally Exposed Individual. The total unabated emission limit for this Notice of Construction is limited to 1.12E+01 mrem/year to the Maximally Exposed Individual.

3) **This process is limited to:**

the Radiochemical Processing Laboratory (RPL) performing radiochemistry research, radioanalytical services, radiochemical process development and mixed-waste treatment activities. Work performed within the RPL involves the use of non-radioactive materials and radioactive materials ranging in amounts from picogram to kilogram quantities of fissionable materials and up to megacurie quantities of other radionuclides.

For this project, Th-232 parent material will be present in the facility as either an oxide [ThO₂] or a nitrate [Th(NO₃)₄]. The parent material is to be maintained in shipping containers, with sub-samples being periodically removed for performing laboratory testing. During the tests the parent material may be subjected to processes (e.g., grinding or suspension in solution) to maximize the recovery of the desired isotopes. The preparation of the parent material and the capture process is to be performed in Room 510.

The prepared materials will then be loaded into a containment vessel and the vessel is sealed. A transport line will be tapped into the lid of the containment vessel. The Rn-220 gas that is generated during batch processing exits the vessel through this transport line to a radon recovery system that is located inside of a laboratory hood in Room 510. The daughter products that result from the decay of Rn-220 are captured by the recovery system, and this system exhausts to a laboratory fume hood that is part of the RPL radiological exhaust system. The exhaust exits the facility through the RPL main stack (EP-325-01-S).

The radionuclides associated with this project are:

Th-232 in the parent material, and

Daughter products resulting from the decay of Th-232 (in order): Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Po-212, Tl-208, and Pb-208 (stable isotope).

4) **The Annual Possession Quantity is limited to the following radionuclides (Curies/year):**

Ac	228	3.30E+00
Bi	212	3.30E+00
Pb	212	3.30E+00
Po	212	3.30E+00
Po	216	3.30E+00
Ra	224	3.30E+00
Ra	228	3.30E+00
Rn	220	2.19E+03
Th	228	3.30E+00
Th	232	3.30E+00
Tl	208	3.30E+00

- 5) These Conditions and Limitations must be documented in an established procedure prior to starting activities granted by this approval (WAC 246-247-040(5) and 246-247-060(5)).

- 6) If this emission unit is not in compliance with the standards in WAC 246-247-040 during construction

or operation, the department reserves the right to require modifications to bring it into compliance (WAC 246-247-060-(2)(d)).

- 7) The facility shall notify the department seven days in advance of any planned pre-operational testing of the emission unit's control, monitoring or containment systems. The department reserves the right to observe such tests (WAC 246-247-060(4)).
- 8) The facility must be able to demonstrate that it has a quality assurance program compatible with applicable national standards (WAC 246-247-075(6)).
- 9) The department retains the right to conduct stack sampling, environmental monitoring or other testing around this unit to assure compliance. If directed by the department, the facility must make provision for such testing (WAC 246-247-075(9) and (10)).
- 10) The facility must be able to demonstrate workers associated with this emission unit are trained in the use and maintenance of control and monitoring systems, and in the performance of associated tests and emergency procedures (WAC 246-247-075(12)).
- 11) The facility must be able to demonstrate the reliability and accuracy of emissions data and other test results from this emission unit (WAC 246-247-075(13)).
- 12) The Department reserves the right to inspect and audit all construction activities, equipment, operations, documents, data and other records related to compliance with the requirements of this chapter (WAC 246-247-080(1)).
- 13) The department may require an ALARACT demonstration at any time (WAC 246-247-080(1)).
- 14) The facility must meet all reporting and record keeping requirements of 40 CFR 61, Subpart H. (WAC 246-247-080(2)).
- 15) The facility shall report all measured or calculated emissions annually (WAC 246-247-080(3)).
- 16) The facility shall report to the department within 24 hours, any unexpected release of radioactivity, shutdown or other condition that, if allowed to persist, or lasts more than four hours, would result in the emission of radionuclides in excess of any standards or limitation in the license. Applicable standards (WAC 246-247-040) include unit specific emission limits (paragraph 5), the offsite dose standard (paragraph 1), BARCT (paragraph 3) or ALARACT (paragraph 4), whichever is applicable, or any limitation included in this approval (paragraph 5) (WAC 246-247-080(5)).
- 17) Prior to permanent shut down of an emission unit or completion of an activity, the permittee shall file a report of closure with the Department of Health. The report of closure shall include the date of the shutdown and indicate whether, despite cessation of operation, there is still a potential for radioactive air emissions and a need for any active or passive ventilation system with emission control and/or monitoring devices. An emission unit or activity will not be considered permanently shut down or completed until a report of closure is received and approved by Health.

Once an emission unit is permanently shut down or an activity is completed, thereby rendering existing permit terms and conditions irrelevant, the permittee shall not be required, after the shutdown or completion, to meet any monitoring, record keeping, and reporting requirements which are no longer applicable for that emission unit or activity.

All records, relating to the shut down emission unit or completion of an activity, generated while the emission unit or activity was in operation, shall be kept in accordance with WAC 246-247-080 (8). (WAC 246-247-080 (6))

- 18) The facility shall maintain readily (promptly) retrievable storage areas (on site) for all records and documents related to, and which may help establish compliance with, the requirements of this chapter.

The facility shall keep these records available for department inspection for at least five years (WAC 246-247-080(8)).

- 19) The facility shall ensure all emissions units are fully accessible to department inspectors. In the event the hazards associated with accessibility to a unit require training and/or restriction or requirements for entry, the facility owner or operator shall inform the department, prior to arrival, of those restrictions or requirements. The owner or operator shall be responsible for providing the necessary training, escorts, and support services to allow the department to inspect the facility. At a minimum for unannounced inspections, such requirements or restrictions must be told to inspectors to provide an opportunity for inspectors to meet those requirements prior to the inspection (WAC 246-247-080(9)).
- 20) The facility shall make available, in timely manner, all documents requested by the department for review. The facility shall allow the department to review documents in advance of an inspection. The facility shall allow access to classified documents by representatives of the department with the appropriate security clearance and a demonstrable need-to-know (WAC 246-247-080(10)).
- 21) **This condition was obsoleted on 12/14/01.** This activity shall be completed by December 31, 2001.
Condition/Limitation added via AIR 01-803.
- 22) This activity shall be completed by the end of October 2005.
- 23) The objective of this project is to capture the progeny nuclides that result from the decay of Th-232. The Rn-220 gas that is generated during the process will be routed through a recovery system that is located inside of a hood in Room 510. As the Rn-220 (gaseous form) decays (55 second half-life), the resulting daughter products will be collected in the recovery system. The recovery system shall be capable of collecting in excess of 80% of the Rn-220 that is generated.
- 24) Before initiation of processing under this NOC, the Rn-220 monitor shall be operational. The exhaust sample will be measured by a Rn-220 monitor collected using the same isokinetic probe that is used to collect the record particulate sample. The radon monitor shall be installed downstream of the record particulate sample, measuring the sample stream that has already been pre-filtered by the record particulate sample.
- 25) The emission unit monitoring system shall have the following activities performed:

Within two years of this approval, and annually thereafter:

- a. A visual check of nozzle position and orientation as well as measurements of nozzle openings;
- b. Checks to ensure the tightness of all fittings and connections as well as a leak test of the entire sampling system; and
- c. Visual inspections for corrosion, physical damage, or dust loading of the probe, sample lines, and monitoring system equipment.

Annually starting within one year of this approval:

- d. A functional/calibration check of monitoring system instrumentation shall be performed; and
- e. USDOE shall provide to WDOH for review copies of the procedures used to perform the above activities.

- 26) Procedures for Rn-220 monitoring shall be forwarded to the department for review.